What is claimed is:

1. A frame rate converting method comprising the steps of:

(a) estimating a plurality of bi-directional motion vectors using motion vectors determined from a current frame and a previous frame;

(b) determining an estimated bi-directional motion vector from step (a), corresponding to a neighboring block, that has the minimum error distortion from among the plurality of motion vectors estimated in step (a);

(c) setting a motion vector of a current block to be the estimated bi-directional motion vector determined in step (b); and

(d) forming a frame to be interpolated with the motion vector set in step (c).

2. The method of claim 1, wherein step (a) further comprises the sub-steps of:

(a-1) detecting a motion vector between the current frame and the previous frame, and assigning the detected motion vector to the frame to be interpolated; and

(a-2) adjusting the motion vector assigned in step (a-1) in the frame to be interpolated according to a block grid.

3. The method of claim 2, wherein the detecting in step (a-1) further comprises the sub-steps of:

decimating an image; and

estimating a motion vector from the decimated image.

4. The method of claim 2, wherein step (a-2) is for estimating a value, which has the minimum error among blocks of the previous frame and the current frame which linearly pass through the center of a block formed according to the block grid, as the bi-directional motion vector of the frame block to be interpolated in the frame to be interpolated.

5. The method of claim 1, further comprising:

evaluating an accuracy of the motion vector of the current block in the frame to be interpolated.

6. The method of claim 1, further comprising:

assigning an initial motion vector for the frame to be interpolated;

evaluating the accuracy of the initial motion vector; and

setting the motion vector of the neighboring block which has the minimum error distortion, as the motion vector of the current block.

7. The method of claim 1, wherein in step (d) the block to be interpolated is formed with the mean of blocks, using the estimated motion vector.

8. The method of claim 1, wherein in step (d) the block to be interpolated is extended and interpolated in an overlapped region with different weights.

9. A frame rate converter comprising:

a bi-directional motion estimating unit operable to obtain a motion vector between a current frame and a previous frame, assign the motion vector to a frame to be interpolated, and estimate the assigned motion vector for a frame to be interpolated;

a spatiotemporal smoothing unit operable to evaluate the accuracy of the motion vector of the current block in the frame to be interpolated in the bi-directional motion estimating unit, and set the motion vector of a neighboring block, which has the minimum error distortion, as the motion vector of the current block; and

an interpolation unit operable to extend the block to be interpolated, and interpolate with the motion vector obtained in the spatiotemporal smoothing unit in an overlapped region with different weights.

10. A de-interlacing method comprising:

(a) estimating bi-directional motion vectors using motion vectors determined from a previous field and a next field;

(b) setting a motion vector of a pixel to be interpolated to be the motion vector estimated in step (a) that has a minimum neighboring error distortion; and

(c) forming the pixel to be interpolated with the motion vector set in the step (b).

11. The de-interlacing method of claim 10, wherein step (a) further comprises the sub-steps of:

(a-1) detecting the motion vector between the current field and the previous field, and assigning the motion vector to the field to be interpolated; and

(a-2) adjusting the motion vector assigned in step (a-1) according to a block grid in the frame to be interpolated.

12. The de-interlacing method of claim 11, wherein step (a-2) further comprises:

estimating a location value, which has the minimum error among blocks of the previous field and the current field which linearly pass through the center of a block formed according to the block grid in the field to be interpolated, as the bi-directional motion vector of the block of the field to be interpolated.

13. The de-interlacing method of claim 10, wherein step (b) further includes:

evaluating the accuracy of the motion vector of the current block in the field to be interpolated; and

setting the motion vector of a neighboring block which has the minimum error distortion, as the motion vector of the current block.

14. The de-interlacing method of claim 10, wherein step (b) further includes:

adjusting the motion vector for the field to be interpolated;

evaluating the accuracy of the motion vector of the current block; and

setting the motion vector of a neighboring block which has the minimum error distortion, as the motion vector of the current block.

15. The de-interlacing method of claim 10, wherein in step (c) the pixel to be interpolated is formed with a mean of pixels, using the estimated motion vector in a field to be interpolated.

16. The de-interlacing method of claim 10, wherein in step (c) the median value of pixel values, to which the estimated motion vector is applied, of the previous field and the next field of the field to be interpolated, the mean value of the pixels, and the values of two pixels vertically neighboring a pixel to be interpolated, is set to the pixel to be interpolated.

17. The de-interlacing method of claim 10, wherein in step (c) the field to be interpolated takes the value of an original pixel where a line has data, and otherwise, takes the median value of a pixel value of the same location of an (n-1)-th field, a pixel value on the same location of an (n+1)-th field, values of pixels vertically neighboring the pixel to be interpolated in an n-th field, and the mean value of these pixel values.

18. A de-interlacing apparatus comprising:

a bi-directional motion estimating unit operable to obtain a motion vector between a current field and a previous field, assign the motion vector to a field to be interpolated, and estimate the assigned motion vector for a field to be interpolated;

a spatiotemporal smoothing unit operable to evaluate the accuracy of the motion vector of a current block in the field to be interpolated in the bi-directional motion estimating

unit, and set the motion vector of a neighboring block, which has the minimum error distortion, as the motion vector of the current block; and

a signal converting unit operable to form a pixel of a line without data, with the median value of pixel values obtained by applying the motion vector set in the spatiotemporal smoothing unit, the mean value of the pixel values, and the values of pixels vertically neighboring the pixel to be interpolated.

19. An adaptive de-interlacing apparatus comprising:

a motion evaluating unit operable to evaluate a degree of motion referring to the value of a motion vector of which error distortion between blocks of a previous field and a current field is the minimum;

a motion-compensated interpolation unit operable to interpolate using the mean of pixels to which bi-directional motion vectors detected for a pixel to be interpolated are applied, or interpolate using the median value of pixel values, to which a motion vector is applied, the mean value of the pixels, and the value between two pixels vertically neighboring the pixel to be interpolated;

a spatiotemporal interpolation unit operable to interpolate using the mean value of pixels neighboring the pixel to be interpolated and pixels to be interpolated in the previous field and the next field of the field to be interpolated; and

a motion adaptation unit operable to adaptively select between the interpolation value of the motion-compensated interpolation unit and the interpolation value of the spatiotemporal interpolation unit according to a degree of motion evaluated in the motion evaluating unit.

20. An adaptive frame rate converter comprising:

a motion evaluating unit for evaluating a degree of motion referring to a value of a motion vector of which error distortion between blocks of a previous frame and a current frame is the minimum;

a motion-compensated interpolation unit for interpolating with the mean of pixels to which bi-directional motion vector detected for a frame to be interpolated is applied;

a spatiotemporal interpolation unit for interpolating with the mean value of pixels neighboring the pixel to be interpolated and pixels to be interpolated in the previous frame and the next frame of the frame to be interpolated; and

a motion adaptation unit for adaptively selecting between the interpolation value of the motion-compensated interpolation unit and the interpolation value of the spatiotemporal interpolation unit according to the degree of motion evaluated in the motion evaluating unit.